

REMARKS

Claims 1 and 3-11 remain pending after amendment.

Claim Amendments

Claim 2 is cancelled and the limitations thereof added to claim 1. The dependencies of claims 3-9 are amended. No new matter is added by this amendment.

Objection to Claims

Claims 4-9 stand objected to due to improper multiple dependencies. In response, the claims are amended in a manner which is believed to overcome the objection. The objection is thus believed to be moot and should be withdrawn.

Rejection under 35 USC 112 (paragraph two)

Claims 4-9 stand rejected under 35 USC 112 (paragraph two) as not distinctly claiming the invention.

In response, the claims are amended in a manner which is believed to overcome the rejection. The rejection is thus believed to be moot and should be withdrawn.

Rejection under 35 USC 102(b)/102(e)

Claims 1, 3, 10 and 11 stand rejected under 35 USC 102(b)/102(e) as being unpatentable over Hasegawa et al '190; Kondo et al '927; and Ishikawa et al '775.

This rejection respectfully is traversed to the extent deemed to apply to the claims as amended.

In response to the rejection, claim 1 is amended to state that “the heating of the polymer in the solid state is performed by flowing a gas heated to a temperature that is not lower than 115°C and lower than 170°C and is lower than the melting point of the polyester polymer.” The cited prior art fails to teach or suggest the embodiment of amended claim 1 – this is made clear by reference to the relevant portions of the cited references as shown in the discussion below, as well as by the Examiner’s failure to point to any portion of the cited references which teach or suggest the embodiment of claim 2 (now residing in claim 1).

Hasegawa et al ‘190

Hasegawa et al is directed to a thermoplastic elastomer composition.

Hasegawa et al ‘190 discloses a thermoplastic polyester elastomer (A) which is a polyester block copolymer and has in the polymer chain (A-1) a high-melting crystalline segment composed mainly of an aromatic polyester unit and (A-2) a low-melting polymer segment composed mainly of an aliphatic polyether unit and/or an aliphatic polyester unit. See column 1, lines 62-67 of the patent.

The patent further states that “The aliphatic polyester unit is obtained by polycondensing the above aliphatic dicarboxylic acid and the above glycol by an ordinary process. It may be a homopolyester, a copolyester, or a polylactone (e.g., a poly- ϵ - caprolactone) obtained by subjecting a cyclic lactone to ring-opening polymerization.” See column 2, lines 42-47.

It is further stated at column 7, lines 22-27 that “In the composition of the present invention, the rubber component (B) is preferably dispersed in the thermoplastic polyester elastomer component (A). The average particle diameter of the rubber

component (B) is preferably 50 μm or less, more preferably 10 μm or less, most preferably 5-0.01 μm ." See column 7, lines 2-27 of the patent.

The patent additionally states "In the present invention, the average particle diameter of the rubber particles is an average of the values obtained by measuring the particle diameters of at least 100 rubber particles in a random visual field observed through an electron microscope. In the case of non-spherical particles, their diameters are taken as those of circles having the same cross-sectional areas." See column 7, lines 30-36 of the patent.

The Examiner's attention is also directed to claim 13 of the reference which states: "13. The composition according to claim 1, wherein the dynamic crosslinking is conducted during kneading in a twin-screw extruder" as well as the following additional portions of the patent:

"In obtaining the composition of the present invention, the thermoplastic polyester elastomer (A) and the rubber (B) are not simply blended but are subjected to dynamic crosslinking in order to impart to the composition much better properties which are not obtained by simple blending. The dynamic crosslinking refers to a technique developed by W.M. Fischer et al of Uniroyal Co. and A.Y. Coran of Monsanto Co. which comprises mixing a rubber with a thermoplastic resin as a matrix, kneading the mixture with a crosslinking agent to subject the rubber to high degree of crosslinking and disperse the rubber finely in the matrix." (column 6, lines 33-43)

"The dynamic crosslinking can be achieved by kneading the above-mentioned components using an extruder, a Banbury mixture, a kneader or the appropriate combination. In view of their productivity, it is most preferable to knead the components

continuously using a twin-screw extruder, and in this case, a plasticizer and a crosslinking agent are added in the middle of the extruder.” (column 7, lines 8-14)

Further, Example 1 states “Using a twin-screw extruder there were kneaded at 210°C at 200 rpm, a thermoplastic polyester elastomer . . . “

Kondo et al

The Kondo et al reference is directed to polyester foamed articles and methods of production thereof.

The patent discloses at claim 1 “A method for producing polyester foamed articles comprising:

obtaining a prepolymer having a number-average molecular weight of at least 10,000 from a reaction of at least an aliphatic glycol and an aliphatic dicarboxylic acid, wherein the reaction includes (a) succinic acid, or its derivatives, reacted with 1,4-butanediol, (b) succinic acid, adipic acid or their derivatives, reacted with 1,4-butanediol, or (c) succinic acid, or its derivatives, reacted with ethylene glycol;

adding from 0.1 to 5 parts by weight of the diisocyanate to 100 parts by weight of the prepolymer in a molten state to obtain a crystalline aliphatic polyester having a melt viscosity of $1.0 \times 10^3 - 1.0 \times 10^6$ poises at a temperature of 190°C and a shear rate of 100 sec^{-1} , and having a melting point of 70-190°C;

adding a foaming agent to the crystalline aliphatic polyester having a melt viscosity of $1.0 \times 10^3 - 1.0 \times 10^6$ poises at a temperature of 190°C and a shear rate of 100 sec^{-1} , and having a melting point of 70-190°C; then

heating and foaming.”

The Examiner's attention is also directed to claim 16 of the patent which states:

"16. Expandable polyester beads comprising: 100 parts by weight of a crystalline aliphatic polyester having a melt viscosity of $1.0 \times 10^3 - 1.0 \times 10^6$ poises at a temperature of 190°C and a shear rate of 100 sec^{-1} , and having a melting point of $70-190^\circ\text{C}$; and 0.5-40 parts by weight of a volatile foaming agent;

wherein said aliphatic polyester is obtained by adding from 0.1 to 5 parts by weight of diisocyanate to 100 parts by weight of a prepolymer in a molten state . . . "

Kondo et al also makes reference to the following as pointed out by the Examiner:

" A method for producing polyester foamed articles comprising: heating and foaming a resin composition comprising a foaming agent, an aliphatic polyester having a melt viscosity of $1.0 \times 10^3 - 1.0 \times 10^6$ poises at a temperature of 190°C and a shear rate of 100 sec^{-1} , and having a melting point of $70-190^\circ\text{C}$. Extrusion or forming in a mold using pre-expanded beads can be applied. The foamed articles such as insulating boxes and cushioning materials have biodegradability and excellent mechanical properties such as tensile strength and cushioning properties." (Abstract)

"Recently, it has been found that a ring-opening polymerization of ϵ -caprolactam produces a higher molecular weight polymer, and proposed to use the polymer as a biodegradable resin. However, the resulting polymer is limited to only special applications because of a low melting point of 62°C and a high cost thereof. Further, although glycolic acid, lactic acid and the like are polymerized by a ring-opening polymerization of glycolide and lactide thereof to obtain polymers with higher molecular weights so as to be sometimes used as medical fibers and the like, the polymers are not used in great amounts as packaging materials, cushioning materials and the like because

their decomposition temperatures are close to their melting point and they have defects in their molding properties.” (column 1, lines 41-55)

“The expandable beads can be produced by suspending the aliphatic polyester particles in water, forcing the volatile foaming agent into the water while stirring, and heating the mixture.” (column 10, lines 57-60)

It is important to note that Kondo et al refers to melt-mixing of the polyester with a coupling agent. That is, “The addition is preferably performed when the polyester is in a uniformly melted state under easily stirrable conditions. Although it is not impossible for the coupling agents to be added to the polyester pre-polymer in the solid state and melted and mixed through an extruder, adding the agents in a polyester preparation unit, or adding them to polyester prepolymer in a melt state (for example, in a kneader) is more practical.” (column 7, lines 27-34).

“To produce a foam by using such an aliphatic polyester and the above-mentioned volatile foaming agent as the main components, a material containing the aliphatic polyester as the main component is melted and kneaded by an extruder while adding the volatile foaming agent thereto, or the granular material is impregnated with the volatile foaming agent (pre-expanded beads) and then extruded into the atmosphere from the extruder.” (column 8, lines 53-61). In the examples, an exclusion step is conducted.

Ishikawa et al

The Ishikawa et al publication is directed to a degradable laminated body and method of production thereof. The reference discloses at claim 1 “A degradable laminated body which comprises (A) a biodegradable resin layer composed of a biodegradable polyester resin composition containing 100 parts by weight of an aliphatic

polyester resin and 1-200 parts by weight of a polylactone resin, and (B) a metallic thin layer which is laminated with at least one surface of said biodegradable resin layer.”

Production Example 1 of the reference states “The polyester resin (A) was kneaded with a polycaprolactone to mold sheet samples as described below. There was mixed 100 parts by weight of the polyester resin A with 11.1 parts by weight of a polycaprolactone resin . . . at 150°C in a laboratory mixer After torque in the mixer became constant, it was further kneaded for 10 minutes while heating to obtain a polyester resin composition. The polyester resin composition obtained was molded with a press equipped with a molding die while heating to obtain a resin sheet having 150 mmL x 150 mmW x 1 mmT. Molding was carried out at preheating temperature of 150°C for 10 minutes, and then by compression while heating at the conditions of 150°C and 100 kg/cm² for 10 minutes. The resin sheet molded was taken out of the molding die after naturally cooled.” (paragraphs [0215] – [0216]).

Regarding the preparation of the composition, the cited reference states “the polylactone, the aliphatic polyester resin, and lubricants are fed into a tumbler, followed by mixing for 10-20 minutes while agitating, and then adding an amide of a fatty acid and, further mixing for 20-30 minutes after adding a finely-powdered silica and starches. After that, melt-kneading is carried out at 140-210°C while using a single- or twin-screw extruder, etc., whereby powder or pellets of a resin composition can be obtained.” (paragraph [0136])

It is clear from the above discussion that the cited prior art fails to teach or suggest the invention of amended claim 1 (as well as the invention of those claims dependent therefrom).

The rejection is thus improper and should be withdrawn.

Double Patenting Rejection

Claims 10 and 11 stand provisionally rejected on the ground of obviousness-type double patenting as being unpatentable over claims 1-15 of co-pending application No. 10/500,692. This rejection respectfully is traversed.

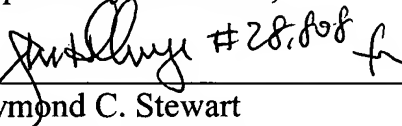
In response, applicants will attempt to maintain a line of distinction between the respective sets of claims. However, as this is a provisional rejection, no action is required by applicants at this time.

A check in the amount of \$450.00 is attached for the requested two-month extension of time.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 CFR 1.16 or under 37 CFR 1.17, particularly extension of time fees.

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Respectfully submitted,

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